Circular No. 92/04.
HEAD TEACHERS.

Glamorgan County Council.

EDUCATION COMMITTEE.

Instruction in Mining in Primary Schools.

1.—The Education Committee has resolved that lessons in subjects appertaining to Coal Mining should be given in all Schools in Mining Districts in the County, special attention being directed to lessons on—

1.—Coal, and how it was formed.
2.—Coal Mine Gases and how they become dangerous.
3.—The Safety Lamp, and how to use it.
4.—How a Colliery is ventilated.
5.—How the Coal is worked in a Mine.
6.—Rules framed for the Miner's safety.

2.—It was also resolved "In order to induce Teachers to qualify themselves, some advantage in the scale of salaries to be adopted, and in selection for promotion should be given to the Teachers who make themselves efficient in this subject.

3.—"The Inspectors of Primary Schools shall award Certificates to those pupils who have attended a full course of lessons in the above subjects, and who give evidence to the Inspector that they have profited by the course."

In order to meet these requirements it is suggested that the boys be asked to write from memory the substance of the lessons given on the six subjects named above. The books containing the reproductions should be kept on the School premises, and presented to the Committee's Inspectors when called for.

I would thank you to reply on fly-leaf herewith how you propose to meet the Committee's resolution, and what assistance you require (if any) from the Committee's Travelling Teachers.

A revised Syllabus for Mining Instruction in Evening Schools has been adopted, and a copy will be sent you on application.

It is highly desirable that Evening Continuation Classes should be established in connection with each of the Committee's Schools, where an average attendance of 10 or upward could be secured. The Sub-Committee for Evening Technical Classes is the Local Authority recognized for the supervision of Continuation Schools.

If you are desirous of conducting Evening Classes, you should communicate immediately with the Secretary of the Local Committee, or with me.

JOHN JAMES, M.A., Ph.D.,
Chief Education Official.

Tetterton. super. Ely School
Cardiff
23. IX. 04

Dear Sir

I am prepared to conduct an Evening Class at the above School if you wish.

Some years ago I had a very successful "Night" School here - The ages of the Scholars ranging from 15 to 50 years of age. We taught the three R's, Geography & Vocal Music, but should the School be re-started I should like to add the subjects of Agriculture and Cottage Gardening.

Copies of H. M. Inspector's Reports I have attached to this sheet for your perusal.

Believe me

Yours obediently

R. A. Bailey

To

John James M.A. Ph.D.

INSTRUCTION IN MINING

IN

PRIMARY SCHOOLS.

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1. *Name of School.* Peterston-super-Ely

2. *Name of Head Teacher.* Robert A. Bailey

3. *Is Mining now taught?* No, and not required, as this is a purely Agricultural District

4. *Standard in which Mining will be taught.* (see opposite page

5. *Approximate number of Boys who will be taught.*

6. *What assistance (if any) is required from the Committee's Travelling Teachers?*

7. *How do you propose to prepare the Boys for the Committee's Mining Certificate (par 3.)*

8. *Do you intend taking Mining in an Evening Continuation Class?*

Under revision

Glamorgan County Council.

EDUCATION COMMITTEE.

SCHEME FOR MINING INSTRUCTION.

SYLLABUS for Evening Continuation Schools in Elementary Principles of Mining and Mining Mathematics; also Mining Mathematics and Geology for Technical Classes.

A.—EVENING CONTINUATION CLASSES.

Introductory Course in Mining Mathematics.

(*a*) Arithmetic.—Addition, subtraction, multiplication, and division of vulgar and decimal fractions; practice, simple proportion, percentages, and square root.

(*b*) Algebra.—The use of letters to represent numbers, signs, simple examples in addition, subtraction, multiplication, and division; substitution of numerical values in simple algebraical expressions; the idea of equations introduced and illustrated by very simple examples and as far as possible applied to the formulæ of mensuration.

(*c*) Mensuration.—Ordinary geometrical figures explained; area and perimeter of rectangular figures; area and length of sides of a right-angled triangle; measurement of the diagonals of rectangular figures.

Elementary Principles of Coal Mining.

The lessons to be illustrated as far as practicable by means of sketches, diagrams, objects, and models, also by occasional visits to study rocks and machinery in position.

(1) Study of rocks constituting the earth's crust: peculiar characteristics of igneous, aqueous, and metamorphic rocks.

(2) Kinds and modes of formation of aqueous rocks—sedimentary, organically and chemically formed; planes of bedding, jointing, and cleatation.

(3) Movements in the crust with their indications: tilting and faulting of rocks; changes in the surface, configuration, and their causes. Weathering agencies: rain, rivers, frost (illustrated as far as possible locally).

(4) Study of coal: its origin, occurrence: varieties—peat, lignites, house coal, steam coal, stone coal: use.

(5) Other minerals: their use and products: Oil shales, ironstones, fireclay, gas, oils, iron and bricks. Lighting and lubricating.

(6) How coal is found: (1) surface indications, (2) fossils, (3) boring.

(7) Methods of opening out in seams of coal: Outcrops—Patches, levels, slants. Deep Seams—Shafts. Shafts—Their form, size, number.

(8) Ordinary method of sinking: (1) Kinds of ground. (2) Process of excavating. (3) Methods of supporting the sides.

(9) Systems of working: (*a*) Methods of cutting the coal. (*b*) Systems of working the mine—pillar and stall; long wall.

(10) Tools required for excavating in coal and hard rock: Picks, wedges, chisels, hand-drilling machines.

(11) Blasting: Explosives—permitted list. Charging and firing.

(12) Ventilation. Natural and artificial means. Coursing—Pipes, bratticing, doors.

(13) Description of Instruments and their use: Water gauge. Anemometer. Thermometer. Barometer.

(14) Sources of pollution, natural and artificial: Occluded gases. Breathing and combustion.

(15) Description and preparation of gases.

(16) Lighting of Mines, non-fiery and fiery. Description of safety lamp. Conditions of safety. Use of safety lamp to detect gas.

(17) Provisions of the Coal Mines Regulations Act with regard to safety.

(18) Methods of supporting roof and sides: timber, iron and steel supports, arches.

(19) How coal is brought out of the Mine: (*a*) Description of roads, tubs, &c. (*b*) Means of conveying—Men, horses, engines.

(20) Winding: How coal is wound from the shaft –Engines, ropes, pulleys, drum, &c.

(21) How water is removed from mines: Adits, watercourse levels, siphons, pumps.

(22) Preparation of coal: Screening, picking, washing, coking, and briquette making.

B.—EVENING TECHNICAL CLASSES.

First Year.

(I).—*Mining Mathematics.*

Arithmetic.—Addition, subtraction, multiplication, and division; fractions, practice (simple and compound), proportion, percentages, profit and loss, averages, square root, cube root; decimals—addition, subtraction, multiplication, and division; tables of weights, length, time, capacity, and area; problems relating to work, pipes, &c.

Algebra.—(1) Addition, subtraction, multiplication, and division of simple expressions; (2) Substitution of numerical values for algebraical expressions; (3) Brackets; (4) Simple equations; (5) Factors of simple expressions; (6) Application of simple formulæ in mensuration, ventilation, mechanics, to illustrate the use of equations.

Mensuration.—Area, length of sides, and diagonals of squares, parallelograms, rhombi, trapezoids, trapezium, circle, sector of circles, triangles; area of curved surfaces of cylinder, cone, and sphere; cubical contents of prizm, cylinder, sphere, cone, and pyramid; exemplification of its use in connection with mining plant.

Mechanics.—(1) Units of work—against friction only, against gravity only; (2) Horsepower; (3) Levers, wheel and axle; (4) Inclined plane, with its application to horse haulage, self-acting inclines, and mechanical systems of haulage; (5) Application of units of work in steam cylinders, pumps, &c.; (6) Principle of cog-wheel gearing; (7) Hydraulics or transmission of pressure by means of liquids; (8) Safe working load and breaking strains of ropes and chains.

(II).—*Geology.*

Division I.

Elements of Geology: Comprising a general synopsis of the elements of Geology with their application in the study of stratigraphy of South Wales.

(1) The Crust:

- (*a*) Origin and classification of rocks constituting the crust.
- (*b*) Types of rocks constituting aqueous, igneous, and metamorphic groups, with their general characters.
- (*c*) Description of common groups of minerals found in rocks, with their character and composition.
- (*d*) Mode of occurrence of each type of rocks found in the crust.
- (*e*) Peculiar characteristics of—
  - (1) Stratified rocks.
  - (2) Igneous rocks.
  - (3) Metamorphic rocks.

(2) The Changes :

(*a*) Due to earth movements caused by contraction in folds, faults, cleatation, jointing, earth tremors, metamorphism and volcanoes.

(*b*) Due to weathering agencies—rain, frost, rivers, sea, &c.

(3) Preservation of impressions and remains of vegetable and

(*a*) Animal life in aqueous deposits ; a study of the most common type of fossils.

(*b*) Their use and importance in establishing a chronological order in stratified rocks.

(4) Classification of rocks :

(*a*) Into periods.

(*b*) Into formation.

(*c*) Brief study of each formation, dwelling more especially upon those found in the British Isles.

(*d*) Study of Geological Maps, their construction and use.

Division II.

Application to the study of the Geology of South Wales.

(1) The stratigraphy of South Wales, giving the general character and places where examples are found of:—

(*a*) Recent formation :—Glacial and Alluvial deposits.

(*b*) Mesozoic formation :—Jurassic, Liassic, Triassic.

(*c*) Palæozoic formation :—Carboniferous, Old Red Sandstone, Silurian, Ordovician, Cambrian, and Pre-Cambrian.

A detailed description of the character, order of sequence of seams of coal, and alternating beds of shales and sandstones found in the coal measures ; with their continuity in quality and thickness in various parts of the Coalfield.

Other economic products derived from the carboniferous formation.

(2) Dynamical effects observed within the Coalfield :

(*a*) Hypogene, (1) The origin, direction, and extent of displacement of folds and faults.
(2) Origin and formation of various qualities of Coal.

(*b*) Epigene, (1) Formation of valleys, with their advantages.
(2) Extent of denudation in various parts of the Coalfield, and how it affects its form.
(3) The area of Coalfield exposed and under the sea.
(4) Its relation to other Coalfields.

(3) Structural aspect of the rocks within the Coalfield as affected by:

Jointing, cleatation, folds and faults; nature and characteristics of seams found in each series, with the changes in quality both horizontally and vertically; nature of roof found in each series; localities where various qualities of coal are found.

(4) Palaeontology of the Coalfield; a study of specimens in fauna and flora peculiar to the Coalfield.

(5) Study of Geological sections of various parts of the Coalfield, horizontal and vertical, with the reports made thereon by the Geological experts of the Ordnance Survey of the South Wales Coalfield.

SECOND YEAR.

Mining Mathematics.

The following subjects may be added to the syllabus arranged for the First Year Course:—

Abridged methods of multiplication, division, and square root; surds and indices, variation.

Logarithms; theory and application of common logarithms.

Slide Rule: Its construction and application.

Plane Geometry: Use of compasses, scale and protractors; their application in geometrical construction of lines, angles, triangles, and rectilineal figures; determination of areas and volumes.

Mass, weight, density, specific gravity.

Graphs and vectors with their application.

Trigonometrical ratios.

Solution of right-angled triangles.

Evaluation of trigonometric formulæ, and polar co-ordinates. All or some of above to be added at teacher's discretion.

Geology.

As in the First Year Course, but studied in more detail.

THIRD YEAR.

Mining Mathematics and *Geology* as in the First and Second Year Courses, but studied in still greater detail.

MINING.

Mining according to syllabus of Board of Education, except that it is proposed to send a petition to the Board suggesting that its syllabus be so amended as to make it possible to take Honours without a knowledge of Metal Mining.

Oct. 12th. 1907

H. H. Stoek, Esq.,
The Editor,
Mines & Minerals,
Scranton, Pa.

Dear Mr. Stoek,

Your interesting letter of the 25th. Sept. is to hand, in regard to Secondary Mining Education.

The subject is of very great importance and interest and I am pleased to know that you have been invited by the Canadian Institute to speak upon it.

My own opinion is that in this country at any rate, better work is being done in the education of mine firemen, undermanagers and managers by Secondary Education, than by the Universities. Very few of the mining engineers who now hold the chief positions of general managers and agents of the mines in this country, are university men, and practically all their officals are practical men who have had no University training. After graduating at the Royal School of Mines and other Colleges the bulk of these men find their way to the Colonies or other foreign countries; very few of them are to be found in British Coal mines.

On the other hand those who have received Secondary mining education at the classes held under the various County Councils, obtain positions as firemen, undermanagers and managers and as I have said most of the positions of trust at collieries here are filled by these men.

In many instances the student avails himself of every

other opportunity for study - viz., attendance at "First Aid" lectures and special lectures by experts on Mining Practice - Chemistry - Electricity - Safety in Mining &c., many of these being arranged by the local branches of the National Association of Colliery Managers; by correspondence to a comparitively slight extent; by careful reading of the mining periodicals.

Secondary Education in Mining may be divided as follows:-

Board of Education "Principles of Mining."
Elementary, Advanced and Honours
Courses.

These are taken in the local classes promoted by the County Councils in all coal mining districts. There are probably 5,000 students in 300 or 400 different townships taking these courses in England & Wales.

Mine Managers and Under - Managers Certificates.

These examinations as you know are not held at the conclusion of a series of lectures or classes but are open to those desirous of obtaining certificates. The candidates have as a rule studied in the first named classes and in addition have availed themselves of the other means already described. First Aid certificates are required by some Boards of Examiners .

We have no secondary mining Schools similar to the Wisconsin one , Large grants are paid to the various colleges in mining districts such as Cardiff , Leeds , Wigan, Newcastle, in aid of the Saturday afternoon and evening courses for miners. This is the nearest resemblance to the method you desrcibe which occurs to

If you write to the principals of the colleges named, especially to Mr. Rankin at Wigan he will be able to give you further particulars.

I am sending you the syllabus of this school, together with a paper which I read at Manchester some time ago which may help you. I do not know of any litrature on the subject which will help you any further; but I have also sent one or two papers on Primary and Continuation School Education which will be interesting.

I trust I have made the matter clear. Do not hesitate to write me again for any further information.

Yours very truly,

James Fouge